CASEOUS LYMPHADENITIS

This is a chronic insidious disease affecting small ruminants and it is characterised by caseous abscesses in peripheral lymph nodes although the organism can spread and cause abscessation in other organs. The disease is caused by a Gram-positive facultative anaerobic and pleomorphic bacterium,

Corynebacterium pseudotuberculosis. The economic importance of caseous lymphadenitis is related to the condemnation of the affected carcasses.

Epidemiology

Caseous lymphadenitis occurs among goat and sheep populations world-wide. The disease is documented to be an important cause of organ and carcass condemnation in goats and sheep.

-The prevalence of caseous lymphadenitis in Kenya has been estimated to be 7% in goats and 2% in sheep, while a 50% morbidity of caseous lymphadenitis in goats has been reported in Nigeria.

- its affects sheep and goats, though it can also infect cattle and horses, and rarely, humans; thus, it is considered an occupational zoonosis.
- The pathogen has been isolated from other species, including pigs, buffaloes, deers, porcupines, llamas, camels and laboratory animals.
- **it causes considerable economic losses**, from **condemnation of skins and carcasses because of abscesses,**
- *C. pseudotuberculosis* is **easily disseminated throughout the herd** by normal management practices and by environmental contamination
- **Sources of infection and form of transmission**
- The main source of infection is infected animals, with or without clinical symptoms; these animals contaminate the soil, water, feed, pastures
- and facilities with **nasal secretions,**
- **feces and pus from abscesses that drain spontaneously** .
- Infected animals that **do not present clinical** symptoms can **eliminate the bacteria through their respiratory tract**

- Transmission can occur through

1- direct or indirect contact or

2- through wounds that come into contact with pus from the abscesses of sick animals

3- Materials that are used in the management of the animals, such as **during castration, identification with ear tags or by tattooing, contact with an uncauterized umbilical stump, and drainage of abscesses,** can transmit the agent .

4-Vectors such as insects (especially flies) should be considered in the transmission of the disease

- This bacterium has been isolated after five months in places where there has been contamination with pus and the concentration of viable microorganisms in the purulent material
- On farms that rear sheep for wool, the equipment and facilities used for shearing can transmit *C. pseudotuberculosis* among animals.

Immersion baths immediately after shearing can disseminate the infectious agent, because these solutions can harbor bacteria for up to 24 h.

-Occasionally, the disease can be acquired by ingestion.

- Inhalation of infective material can lead to lung abscesses or pneumonia.

Wet skin can be easily macerated and thus enhance penetration of bacteria. The bacteria can survive in soils which are rich in organic matter or in formites at low temperature for along time.

Pastures, animals shed and dips contaminated with pus discharges from ruptured or incised abscesses may be a source of infection.

- The use of contaminated hypodermic needles was reported to be responsible for an outbreak of the disease in a goat herd in Nigeria.

Pathogenesis

- After penetrating into the host, which generally occurs through the oral, nasal and ocular mucosa, or through skin wounds,
- the agent disseminates **freely or within macrophages,** mainly through the afferent lymphatic system, to local lymph nodes and internal organs.

This process depends on the ability of the agent to infect macrophages, resist phagolysosomes and kill cells, liberating new bacteria and causing necrosis,

Caseous lymphadenitis affects animals of all ages although it is commonly encountered in adult animals because of cumulative chances of getting infected rather than a true age- related susceptibility.

Pathogenesis

After penetration through the skin *C. pseudotuberculosis* is carried via the lymphatic and blood vessels either as free or within macrophages to the regional lymph nodes or other parts of the body.

The pathogenicity of *C. pseudotuberculosis* is related to its ability to produce a haemolysin and a toxic wall factor.

It has been found that the haemolysin has a phospholipase activity and it acts on the sphingomyelin of the erythrocytes and endothelial cell membranes causing haemolysis and increased vascular permeability.

This facilitates further invasion of the bacteria in the tissues. The toxic wall factor protects the bacterium from phagocytosis by lysosomes thus enabling it to survive within phagolysosomes.

This is considered responsible for the chronicity of the lesions associated with *C. pseudotuberculosis.* The final outcome of the infection is determined by the initial number of bacteria entering the body of the host, the multiplication rate of the organisms and efficiency of the host defence mechanisms.

Clinical features

- The incubation period can extend from 3 weeks to 4-5 months. Caseous

lymphadenitis is a mild disease characterised mainly by abscessation of the prescapular, parotid, itis is a mild disease in its superficial form is characterized by abscessation and infection of external lymph nodes, such as the submandibular, parotid,

pre-scapular, subiliac, popliteal and supramammary lymph nodes .

- while the visceral form is characterized by abscessing of internal organs, such as lungs, liver, kidneys, uterus, spleen and internal lymph nodes, such as the mediastinal and bronchial lymph nodes.
- Internal abscesses are normally associated with weight loss and weakness, known in sheep as **thin-ewe syndrome.**
- The mature abscesses easily leak through fistulas, releasing **purulent whitish-green** discharges into the environment or into the affected organ.
- Abscesses usually recur, months or years later, in the same animal, due to the failure to eliminate the infection.
- The general health of the animals is usually not affected although the presence of numerous active abscesses leads to progressive weight loss, weakness, collapse, coughing or respiratory distress.
- **Other non-specific but rare signs may occur** when the location of the abscesses interfere with the normal function of a particular organ or system.
- It has also been observed that toxaemia may occur in kids and lambs leading to arthritis and sometimes death.
- Differences in the place of the abscesses between sheep and goats have been reported,
- the visceral form being more frequent among sheep .
- -and the superficial form among goats
- External abscesses in the lymph nodes of the head and neck are more common in goats.
- Differences **in the appearance of abscess content** have also been reported between sheep and goats;
- in sheep the contents have a laminar form when cut, similar to the layers of an onion, caused by the formation of layers of fibrous tissue and thick caseous material,
- while abscesses in goats have a **thin and pasty exudate.**
- while the **subiliac and pre-scapular lymph nodes are more commonly**

affected in sheep .

- submandibular and precrural lymph nodes.

- Occasionally, abscessation may occur in the lungs, kidneys, spleen, heart, tongue, spinal cord, brain and joints.

The general health of the animals is usually not affected although the presence of numerous active abscesses leads to progressive weight loss, weakness, collapse, coughing or respiratory distress.

Pathological features

The major gross pathological feature is the suppuration of the affected lymph nodes. The incised lymph nodes contain a thick greenish-white or yellowish-white insipissated or semi fluid pus surrounded by a fibrous capsule.

Insipissation may not occur in goats.

On histopathology, there is a necrotic central area surrounded by neutrophils, giant cells, macrophages, plasma and epithelial cells.

Gram-negative organisms can be demonstrated in smears made from the edge of the lesion. Infection of the lungs is associated with interstitial fibrosis.

Diagnosis

A provisional diagnosis of the disease can be based on clinical and pathological features. Confirmation of the disease is achieved by the demonstration of *C. pseudotuberculosis* in smears made from pus. In Gram-stained smears, the bacteria appear as pleomorphic Gram- positive rods.

-Pus cultured on sheep or ox blood agar for 24-48 hours at 37 °C produce small white and dry colonies surrounded by a narrow zone of haemolysis.

-The colonies become dry, crumbly and creamy in colour with time.

Other bacteria such as *S. aureus, C. pyogenes* and *Actinomyces pyogenes* which cause similar abscesses in or close to lymph nodes can be differentiated by isolation and characterisation of the bacteria.

-Other causes of chronic wasting such as chronic parasitism and malnutrition

should also be considered in the differential diagnosis.

- **DIFFERENTIAL DIAGNOSIS**
- Pyogranulomatous lesions, such as found in

1-**actinobacillosis,**
2- tuberculosis and
3- superficial abscesses caused by *Staphylococcus aureus* and
4- *Actinomyces pyogenes*,
-must be differentiated from caseous lymphadenitis .

- The superficial form of the disease should also be differentiated from
- submandibular edema caused by parasites,

1- **Fasciola hepatica and**
2- *Haemonchus sp*.,
3- **salivary cysts,**
4- lymphosarcoma and
5- subcutaneous inoculation of vaccines.
The debilitating visceral form can be clinically similar to :

- **- chronic parasitism,**
- **- thinning due to abnormal waste of teeth,**
- **-alveolar periodontitis,**
- **- malnutrition and chronic diseases, such as pulmonary adenomatosis, neoplasias and scrapie .**

- **-Pneumonias caused by *Mycobacterium bovis,***
- ***-Pasteurella haemolytica, Pasteurella multocida* or ovine progressive pneumonia,**
- **due to Maedi-Visna virus infection (highly infectious viral disease affecting goats and sheep. It is mainly transmitted through the ingestion of milk from a virus infected sheep, although disease can be spread within flocks through direct contact or contamination. The main clinical signs are progressive paralysis, wasting, arthritis and chronic mastitis. MV has a long incubation period and cannot be detected early in an animal's life. The signs are not normally visible until adulthood.)**
- can make the diagnosis of **caseous lymphadenitis even more difficult.**

- In sheep,
- **orchitis and epidydimitis caused by**

C. pseudotuberculosis **needs to be differentiated from similar lesions caused by**

1-Brucella ovis,

2-Actinobacillus seminis,

3- Histophilus ovis **and**

4- ***Pasteurella spp***

Treatment of affected animals consists

- of the drainage of abscesses,
- followed by cleansing and
- chemical cauterization, usually with 10% iodine,
- or even removal of the affected superficial lymph nodes .
- Drainage of the abscess should be done in a way that avoids environmental contamination, with disinfection of the surgical material before and after the procedure,
- Another treatment option is antibiotic therapy,

CONTROL AND PROPHYLAXIS

- An effective program for the control of caseous lymphadenitis should be based on
- clinical inspection and periodic serology of all animals in the flock,
- which includes recently-acquired animals and those that return to the herd,
- culling the ones that have clinical signs or that are serologically positive.
- The main source of infection for a flock is introduction of infected or abscessed animals into a herd, which results in a high frequency of abscesses after two or three years.

- reduce the environmental risk of wounding should also be adopted, such as the use of smooth wire fences, troughs and facilities without sharp edges,
- disinfection of surgical, ear tagging and shearing instruments,
- systematic use of individual disposable needles,
- effective control of insects,
- and disinfection of newborns' navels and any other wounds with 10% iodine.
- All control programs should be based on sanitary education of herd owners and technical personnel,

VACCINATION

- The vaccines commercially available have different relevant features that should be considered on their use.
- Not all of the vaccines licensed for use in sheep have the same efficiency in goats.